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CARDIAC DISEASE.

By T. LAUDER BRUNTON, M.D., LL.D., F.R.C.P., F.R.S.

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CARDIAC DISEASE.[1]

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I do not think any poem has ever been more severely criticised, or more frequently quoted, than Longfellow's "Psalm of Life." Possibly the critic is right; the poem, nevertheless, does express the feelings of human hearts so well that almost no poem has been more frequently referred to. It has been quoted in the past as it will be in the future, and I am going to take advantage of it to-day. Part of one verse runs—

> "And our hearts, though stout and brave,
> Still, like muffled drums, are beating
> Funeral marches to the grave."

The first part of this verse has a great deal to do with the medical profession as well as the last, for it is—

> "Art is long and time is fleeting,"

a sentence adopted by the Royal College of Physicians as their motto, though taken by them from Hippocrates and not from Longfellow.

I do not suppose that there is any class of men who feel the truth of the whole of that verse so much as medical men. They recognise only too well that "Art is long and time is fleeting," for while they are waiting for their art to improve, the time is going fast, and their patients are dying. I do not think that the public in general really appreciate how much feeling a medical man throws into the treatment of his patients, and how much his failure to relieve them, or to cure them, takes out of him. Many a man in general practice sees his patients frequently, and he learns to know—often to love—them, so that when they die it is really a severe blow to him, almost as severe as to some of the patient's relatives, and for weeks afterwards that doctor may be suffering from the loss of his patient. It is also a very severe trial to a medical man to be unable to give help when patients want it from him. In the first paper of mine ever printed—I began—"Few things are more distressing to a physician than to stand beside a suffering patient, who is anxiously looking to him for that relief from pain which he feels himself utterly unable to afford. His sympathy for the sufferer, and the regret he feels for the impotence of his art, engrave the picture indelibly upon his mind, and serve as a constant and urgent stimulus in his search after the causes of the pain and the means by which it may be alleviated."[1]

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[1] A clinical lecture delivered at St. Bartholomew's Hospital.

Now, we find in certain cases of heart disease exceedingly severe pain, which is one of the most awful symptoms to witness in its worst form. We have had in the wards two cases to which I wish to draw your attention to-day, and these cases are instructive, first of all, as affording very well-marked types of severe cardiac disease; secondly, as showing how much our art has progressed; and, thirdly, as showing, unfortunately, how much remains for us yet to learn. Because by the use of the various remedies we have been enabled to alleviate the pains from which those patients were suffering, but, unfortunately, in spite of all that we could do, both patients have died.

The first case to which I would like to draw your attention is that of a labourer, admitted to Rahere Ward. The cardiac dulness in this case extended from the third rib downwards and outwards to the apex beat, which was in the sixth space, 2½ in. outside the nipple, so we had an enormous cardiac dulness. The apex beat was diffuse and heaving; there was a systolic murmur audible at the apex, and extending for a considerable distance around it. There was at the base a double murmur; a systolic, propagated upwards along the arteries, and a diastolic, propagated downwards along the sternum. The beats of the heart were exceedingly irregular. There were two fairly good beats succeeding one another, and then a sort of irregular number of beats clustered together, so that they could not be differentiated one from the other; then followed one or two definite beats, and again this irregular running kind of beat. There was a considerable amount of shortness of breath, and there was a great deal of pain over the cardiac region. The man was by trade a labourer, and had been accustomed to carry very heavy weights; for example, he had been accustomed to carry a hod of mortar weighing about a hundredweight up a ladder twenty feet high, and had to do this many times a day. From the signs which we found, the diagnosis was that his aortic valves were thickened, presenting an obstruction to the flow of blood; that the aorta itself was probably very atheromatous and rough; and that the aortic valves were incompetent, allowing of the regurgitation of blood. In consequence of the condition of the valves the left ventricle itself had become hypertrophied, so as to make up, by increased muscular power, for the loss of the valves, which throws more work on the cardiac muscle, so that it is like the little boy who went to school on a frosty day, and slipped two steps back for every step he took forward. In consequence of the hypertrophied and enlarged heart beginning to degenerate, the left ventricle was commencing to dilate, and we had therefore secondary mitral regurgitation. Of course, in a case like this, it is very difficult indeed to say whether the mitral regurgitation is simply due to the mitral orifice becoming too large for the valves, or whether the mitral valves themselves are also diseased. At any rate, we knew that the mitral valves were not closing the mitral orifice, and that in consequence of this the man was suffering from mitral regurgitation. Consequent upon the mitral regurgitation, of course, there must be a certain amount of congestion of the lungs, or at least of the pulmonary capillaries, which interferes with the flow of blood through them, and causes shortness of breath. Now, that poem of Longfellow's may help us a little bit in regard to treatment. The hearts, as he says, "like muffled drums, are beating funeral marches to the grave." Now, if a band of soldiers have, let us say, half a mile to walk to a comrade's grave, and they beat their drums quickly and march accordingly, they will get sooner to the grave; and if the heart beats more quickly, other things being equal, it will come to an end sooner. Therefore, when we find that the heart is beginning to beat very quickly in any case of heart disease, we know that there is a great risk of its becoming exhausted. A man in general practice, who was a shrewd observer, said to me not very long ago, "Whenever I find a heart in a case of fever going over 120, I always look upon the prognosis as being bad." Now, in cases where the heart is barely up to its work, if you can lessen the work it has to do, so much the better for the heart: and in cases of cardiac disease you may often do a very great deal indeed by simply keeping your patient quiet. It is not every man, however, who understands what is meant by quiet. Some years ago I went to see a patient in the north of England who was suffering from cardiac disease. His doctor had told him exactly what he ought to do, namely, that he must keep perfectly quiet; but the man insisted upon walking about and going to the closet, and would not keep quiet, because he had known the doctor from a child, and simply thought he knew better than the doctor did. At my consultation I told him precisely the same thing as the doctor had told him before, namely, to keep quiet, and consequently he got well; at least he so far recovered, as to live for five years after I saw him, although at that time his heart was in such a condition that he was utterly unable to lie down. In the case of a man like the present patient, whose heart has been over-tried by the exercise he has had to take, naturally the first thing to be done is to lessen the work of his heart. He was accordingly put to bed and kept there, and was not allowed to get up for any purpose whatever. Almost immediately after getting rest he began to improve somewhat, but he did not improve quite at the rate which was either wished or expected. He was put simply upon a medicine which would do him neither good nor harm, but he had also some nitroglycerin which he was to employ whenever the accession of pain came on. In these cases we have made a trial of various things which lessen the pain in angina pectoris. We have tried nitrite of amyl, nitroglycerin, and a new drug, nitroerythrol, all of which have the property of lessening the resistance in the vessels.

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[1] "On the Use of Nitrite of Amyl in Angina Pectoris," *Lancet*, London, July 27, 1867.

The pain of angina pectoris has been the subject of much discussion, and even now people are not agreed entirely as to its causation. I think, however, it may be safely held that the pain of angina pectoris, the pain which is caused by something wrong in the hollow of that muscular organ called the heart, is like the pain which you find in other hollow muscular organs—in the stomach, in the intestine, or in the bladder. It is when those organs contract, and are unable to expel their contents, that you get pain in the stomach, pain in the intestine, or pain in the bladder; and the same, I think, is the case with the heart. The heart may have difficulty in expelling its contents from two reasons—either it may be too feeble, or the resistance which is opposed to it may be too great. It is not always easy to increase the strength of the heart, but we can often relieve the pain of angina pectoris by lessening the resistance. The first time a drug was used for this purpose was when I used it in 1867 in a case of angina pectoris, my using it being due to a knowledge of its physiological action. Gamgee found that nitrite of amyl had the power of lowering arterial tension, and by taking sphymographic tracings of a case of angina pectoris I found that during the attack the tension was greatly raised. Naturally, then, a drug which would lower the pulse-tension would be likely to lessen the pain of a disease in which the pulse-tension was raised. I tried it and found it answered. Since that time it has been used, and several other nitrites have also been employed. All the nitrites have a similar action. It is not the amyl or the butyl or the soda with which the nitrous acid is combined that has the chief action; it is the nitrous acid or other substances which yield nitrous acid, that lower the pressure.

The great disadvantage of the simple nitrites is that they act for too short a time. They act quickly, but the dilatation of the vessels which they induce is not kept up sufficiently long. For this reason nitroglycerin has been employed—a nitrate which acts precisely like a nitrite, but for a much longer time. Glycerin, as you know, is a triatomic alcohol; and it was to be supposed that if you get a tetratomic alcohol, and nitrated it, you would obtain a substance which would have a still more powerful action than nitrated triatomic alcohol. Tetronitrate of erythrol was therefore proposed by Professor Bradbury, and we gave it in this case. The spasms of pain were very slightly relieved indeed by nitrite of amyl; they were relieved more by nitroglycerin;

and the nitroerythrol, according to the patient's own statement, seemed to be the most efficacious of all. It must, however, be remembered, in the trial of new drugs, that there are differences in patients, and that, of course, what suits one man may not suit another, so that one must not conclude that, because the nitrate of erythrol was the most successful of the three in this case, it will be always the most successful in relieving the pain of angina pectoris in other cases. By means of those three substances we were able to relieve the pain in this instance. All the nitrites are, however, simply palliative measures—they relieve the pain for the time being, but they do not relieve the condition of the heart and vessels upon which the pain depends. In order to try and lessen the condition which had given rise to the pain, we put this patient upon a plan of treatment which is usually most successful. We were unable to tell definitely the state of the coronary arteries in this patient, but, as a rule, it is found that the coronary arteries are involved in angina pectoris; so that the heart is unable to contract as it ought to do. Now, atheroma, which causes the contraction of the coronary arteries, is a process very similar to what you find in the rheumatic joint: and Virchow has given to atheroma the name of "arteritis deformans," so as to connect the process with the rheumatic inflammation, arthritis deformans. In rheumatic joints, as you know, the drug most generally employed is iodide of potassium, and this drug has been found to be the one that is most serviceable by its continued administration in relieving the pain of angina pectoris and preventing its return. We put our patient upon a mixture of iodide of potassium and salicylate of sodium. As you know, from inflamed joints, arthritis deformans is a disease that is very slightly ameliorated by treatment; and we know only too well that atheroma is only very slightly lessened by treatment. In order to obtain further improvement in this case, massage was ordered. The effect of massage is to increase the general nutrition of the body by giving to the patient the same results as he would get from exercise. It is practically exercise without fatigue. During massage the vessels of the muscles become dilated, the flow of blood through them is increased, and the tension for the time being becomes less, so that the patient gets from the massage to a certain extent the same relief from pain as he would get from nitrite of amyl or nitroglycerin. But massage is only the first step towards getting the heart and vessels into a healthy condition. The next step, which may be used when the patient is sufficiently strong, is to give active movement. The first stage in treatment in all cases of heart disease is perfect rest; the next is massage with passive movements, the patient making no movement himself; next to that comes active movement; and lastly, I may say, comes active exercise.

The patient had massage on November 26, but this was only continued for about a week; and then the next step was begun by giving the treatment which is known so widely now by the name of Schott's treatment,—not because Schott has the credit of originating it, but of making it widely known. This was carried on very kindly by Dr. Leslie Thorne, who himself gave the patient the necessary treatment. This treatment consists of two parts—movements and baths. The movements act upon the muscles, the baths upon the skin, and through the skin upon the cardiac nerves. Both those things seem to have the power of making the cardiac beats both slower and stronger. The movements are very simple, the essence of them being that they shall be slowly performed. If you raise your hand quickly and lower it quickly, you probably put into action in the one case only the flexors, and in the other the extensors; but if you raise your arm very slowly you put into action the flexors and extensors gently for a length of time, and the action of the flexors is opposed by the extensors during the whole time that you are raising the arm, flexing it slowly or extending it slowly. Here, then, we have what is really the essence of the Schott movements—gentle movements with resistance. The resistance is put in first of all by the patient himself opposing the flexors to the extensors, or *vice versâ*; then it may be increased by an attendant, who, while the patient flexes his arm, slightly presses against it, and in this way opposes a certain resistance to each movement. In order to make this more clear to you, I will just demonstrate one or two of the first exercises. The first is, the arms are raised slowly outwards from the side till they are level with the shoulders, and after a pause they should be slowly lowered. When the arms are in a horizontal position the patient should be given a little rest. The patient's face should be watched to see whether he is putting in too much resistance, and you can generally tell by the movements of his nostrils or by listening to the breathing. If the resistance be gradually increased day by day, it may at last become very great indeed. This treatment is exceedingly useful. It tends to cause the heart to contract, to beat more slowly, and to beat more firmly. We found in this case that the cardiac dulness became at first diminished, but after a while, without any reason that we could assign, the heart again began to dilate, and then, unfortunately, pain came on again worse than before, although for a time the pains had been less. Finally, the temperature began to rise, and the patient died, without any very good reason, so far as we could find, why he died at that time more than any other. It almost seemed to one as if he had had some slight infective process going on: one was almost inclined to think that what is usually termed "a touch of influenza" had come on the top of his heart disease, because one did not see why his temperature should rise and why he should die. There was no light thrown upon it by the post-mortem examination. In this case we were unable to proceed any further with either the movements or the baths, but, in cases where the patient gets so well as to allow of it, a further treatment may be used.

This is generally known by the name of Oertel's treatment, and is simply a process of gradual training by exercise in the open air, making the patient walk slowly up a steeper and steeper incline day by day until he gets perfectly strong. The best example of training, and the one which I think men ought to set before them always in treating cases of cardiac disease, is the classic one of Milo of Crotona. You have all read when you were at school of this famous wrestler, who was able to carry a full-grown bull on his back; the way he trained for it was this:—He took a new-born calf, and carried it every day; every day it grew a little heavier, but the increase was so slight that he never noticed it; and at last, when it had grown to a full-sized bull, he was able to carry it upon his shoulder without fatigue. It is the *gentle* increase day by day that will enable you to cure, or at least greatly benefit, your cases of cardiac disease; and the great difficulty and stumbling-block that lies in one's way is the tendency to hurry the treatment. One is very tempted to go a little too fast and to make the patient go a little more quickly; against this one must try and guard.

The other case to which I would draw your attention very shortly is one which also proved fatal. It was the case of a bookseller, who was admitted with symptoms in some respects resembling, and in others differing from, those of the case just referred to. He also had a systolic murmur at the base, probably indicating atheroma of the aorta. I should have said that the signs we found in the former case at the post-mortem were found to have been rightly interpreted. One point in regard to the post-mortem that was chiefly interesting, however, was that the left coronary artery was not found to be atheromatous at the point where it left the aorta, as one expected it would have been. The aorta itself was very atheromatous and in some places ulcerated, but the mouth of the left coronary was not atheromatous. On slitting up the artery, however, it was found to be atheromatous about 1½ in. from the mouth, inside the ventricular wall.

In the second case we had probably to do with an atheromatous aorta, and probably some constriction of the aortic orifice. There was a diastolic murmur also, showing that there was aortic regurgitation, and there was also a loud double apical murmur of mitral regurgitation and mitral obstruction. In addition to these changes at the orifices of the heart, to the mitral obstruction and mitral regurgitation, there was almost certainly adherent pericardium, because the patient had suffered very much from pericarditis before admission. There was also a great difference in regard to the liver. In the first case the liver was nearly normal in size, and there was little or no fluid in the peritoneal cavity; but in this case the liver was of enormous size, and there was a large amount of fluid in the peritoneal cavity.

Time presses, and I will not detain you much longer with this case, but I will simply draw your attention to a method of treatment which we tried in it, and which I believe has not been previously used in heart disease. It was quite clear that the patient was not likely to get well, because we had tried all the drugs that seemed likely, and he was not much improved. It occurred to me that possibly by treating the aorta in the same way as one would treat a joint, one might get some good result. We were bound to do something for him, if we were going to get him well, because all that we had tried before was useless. Now, as many of you know, Mr. Willett and Mr. Walsham have been trying a hot-air bath in the treatment of joint diseases in this hospital. We borrowed this hot-air bath, and tried it on our case, by simply putting the left hand into the hot-air bath at a temperature of about 240°. Of course this temperature would be sufficient to burn the arm unless it were protected thoroughly by cotton-wool, and the air which surrounds it were perfectly dry, so that the arm is not burnt or scalded, as it would be by steam at the temperature of 240°. This plan had the curious result of raising the temperature of the body as a whole 2°, the thermometer in the mouth registering 2° F. more after the administration of the bath than it had done before. It seemed to me, and I think also to the patient, that he was somewhat relieved by this for a while; but this treatment also proved to be unsuccessful, and, about ten days after the first patient died, the second got a rise of temperature, and after the temperature had been up for two or three days he died also. I regret to say that we did not obtain a post-mortem, so that we were unable to verify the diagnosis. These two cases show us that we can to a great extent relieve cardiac pain, but in very bad cases we are often powerless to avert a fatal result; and although those two cases show our powerlessness in a way which is very trying, yet, when we look over a very large number of cases of cardiac disease, where the symptoms are not so severe as they were in those, I do not think that there is anything that strikes us more than the great good we can do in cardiac disease. Taken as a rule, I do not know that there is any class of cases more successful to treat than cardiac cases, and the general plan of treatment is this:—Take as little out of the heart as you can, and increase the nutrition both of the heart and the whole body as much as you can. The essential points for doing this are:—In severe cases—first, rest, combining it afterwards with massage, later on with gentle movements, possibly also with baths; and after these have done their work we may then proceed to graduated exercises. But when you do commence graduated exercises, and indeed throughout the whole plan of treatment, always take care not to do too much.

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